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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Mercure et al.

Serial No.: 09/263,186

Filed: March 5, 1999

For: Reinforced Shrink Wrap and Method of  
Manufacture

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Group No.: 1771

Examiner: U. Ruddock

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Washington, DC 20231

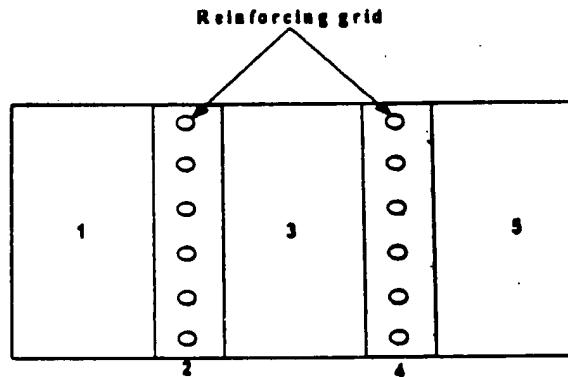
Dear Sir:

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**DECLARATION OF MR. DENNIS J. OLHEISER  
UNDER 37 C.F.R. § 1.132**

I, Dennis J. Olheiser, am an inventor of the above-referenced patent application. I have measured or caused the measurement of the peel strength of various 5-ply shrink laminates. The average peel strength of 5-ply shrink laminates with tie layers is about 70 oz., whereas the average peel strength of 5-ply shrink laminates with adhesive layers is about 25 oz.

The 5-ply shrink laminates have a cross-sectional structure illustrated in the following. The exemplified structure is one possible construction of a shrink laminate and should not be construed to limited the invention as otherwise described in the patent application.



All shrink laminates have a thickness in the range of about 4 mils to about 14 mils. A typical 5 ply construction, as illustrated above, comprises an outer thermoplastic film layer (1), a tie layer or adhesive layer (2) with a reinforcing grid, a highly irradiated polyolefin shrink film (3), a tie layer or adhesive layer (4) with a reinforcing grid, and an inner thermoplastic film layer (5).

Layers 2 and 4 are either adhesive layers or tie layers. The adhesive layers are made from a water based acrylic pressure sensitive adhesive, whereas the tie layers are made from low modulus polyolefin resins. Typically, the adhesive layers or tie layers have a thickness of about 0.5 to 1.5 mils thick. The shrink laminates with adhesive layers were made in accordance with the method disclosed in U.S. Patent No. 5,328,743. The shrink laminates with tie layers were made in accordance with the processes described in the above-referenced patent application.

The peel strength of each shrink laminate was obtained in accordance with ASTM D-1876, which is the standard test method for peel resistance of adhesives (T-peel test). A copy of the ASTM D-1876 testing procedures is attached herewith as Appendix A. Generally, the test is conducted by taking one inch wide by twelve inch long samples of a laminated product. A small section of the laminate is separated by hand to allow sufficient material to be secured in the grips of a tensile testing machine. One edge of the separated section is secured in the upper grips and the remaining section of the laminate is secured in the lower grips. The bottom grip is fixed, and the upper grip is moved at a rate of 10 inches per minute.

About 15 shrink laminates with adhesive layers produced over a two month period were tested and the average peel strength of the 5-ply shrink laminates with adhesive layers was about 25 oz. On the other hand, about 30 shrink laminates with tie layers produced over a two month period were tested, the average peel strength of the 5-ply shrink laminates was about 70 oz. The data show that a tie layer has a higher lamination strength than an adhesive layer in a multi-layered shrink laminate.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by

fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of any application for which it is used.

3/26/2001  
Date

Dennis J. Olheiser  
Dennis J. Olheiser



## Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)<sup>1</sup>

This standard is issued under the fixed designation D 1876; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or approval.

This standard has been approved for use by agencies of the Department of Defense as part of Federal Test Method Standard No. 173a. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

### INTRODUCTION

The accuracy of the results of strength tests of adhesive bonds will depend on the conditions under which the bonding process is carried out. Unless otherwise agreed upon by the manufacturer and the purchaser, the bonding conditions shall be prescribed by the manufacturer of the adhesive. In order to ensure that complete information is available to the individual conducting the tests, the manufacturer of the adhesive shall furnish numerical values and other specific information for each of the following variables:

- (1) Procedure for preparation of the surfaces prior to application of the adhesive, the cleaning and drying of metal surfaces, and special surface treatments such as sanding, which are not specifically limited by the pertinent test method.
  - (2) Complete mixing directions for the adhesive.
  - (3) Conditions for application of the adhesive, including the rate of spread or thickness of film, number of coats to be applied, whether to be applied to one or both surfaces, and the conditions of drying where more than one coat is required.
  - (4) Assembly conditions before application of pressure, including the room temperature, length of time, and whether open or closed assembly is to be used.
  - (5) Curing conditions, including the amount of pressure to be applied, the length of time under pressure, and the temperature of the assembly when under pressure. It should be stated whether this temperature is that of the glue line, or of the atmosphere at which the assembly is to be maintained.
  - (6) Conditioning procedure before testing, unless a standard procedure is specified, including the length of time, temperature, and relative humidity.
- A range may be prescribed for any variable by the manufacturer of the adhesive, if it can be assumed by the test operator that any arbitrarily chosen value within such a range or any combination of such values for several variables will be acceptable to both the manufacturer and the purchaser of the adhesive.

### 1. Scope

- 1.1 This test method is primarily intended for determining the relative peel resistance of adhesive bonds between flexible adherends by means of a T-type specimen.
- 1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.
- 1.3 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate<sup>2</sup>  
D 907 Terminology of Adhesives<sup>3</sup>

### 3. Terminology

3.1 **Definitions**—Many terms in this test method are defined in Terminology D 907.

3.1.1 **peel strength,  $\sigma$** —the average load per unit width of bondline required to separate progressively a flexible member from a rigid member or another flexible member.

**Discussion**—Flexible has different meanings in different peel tests, such as "T", 180-degree, flexing-roller, or climbing-drum. The angle between the members varies with the type of peel test.

#### 3.2 Descriptions of Terms Specific to This Standard:

3.2.1 **flexible, adj**—indicates that the adherends shall have

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of D14.50 on Metal Bonding Adhesives. Current edition approved Sept. 10, 1993. Published November 1993. Originally released as D 1876 - 61 T. Last previous edition D 1876 - 93.

<sup>2</sup> Annual Book of ASTM Standards, Vol 03.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 15.06.

7.3 Determine the peel resistance over at least a 127-mm (5-in.) length of the bond line after the initial peak.

### 8. Calculation

8.1 Determine from the autographic curve for the first 127 mm (5 in.) of peeling after the initial peak the average peeling load in pounds per inch of the specimen width required to separate the adherends. It is preferred that the average to be determined from the curve with the use of a planimeter.

NOTE 10—In case a planimeter is not used, the average may be calculated as the average of load readings taken at fixed increments of crosshead motion. For example, the load may be recorded at each 25-mm (1-in.) interval of head motion (or each 12.7-mm (0.5-in.) interval of bond separation) following the initial peak, until at least ten readings have been obtained.

### 9. Report

9.1 Report the following information:

9.1.1 Complete identification of the adhesive tested, including type, source, manufacturer's code number, batch or lot number, form, etc.,

9.1.2 Complete identification of adherends used, including material, thickness, surface preparation, and orientation,

9.1.3 Description of bonding process, including method of application of adhesive, glue-line thickness, drying or curing conditions (where applicable), curing time, temperature, and pressure,

9.1.4 Average thickness of adhesive layer after formation

of the joint, within 0.025 mm (0.001 in.). The method of obtaining the thickness of the adhesive layer shall be described including procedure, location of measurement, and range of measurements.

9.1.5 Complete description of the test specimens, including dimensions and construction of the test specimens, conditions used for cutting individual test specimens, number of test panels represented, and number of individual test specimens,

9.1.6 Conditioning procedure prior to testing,

9.1.7 Type of test machine and crosshead separation rate used,

9.1.8 Method of recording load and determining average load,

9.1.9 Average, maximum, and minimum peeling load values for each individual specimen,

9.1.10 Average T-peel strength in pounds per inch of width for each combination of materials and constructions under test, and

9.1.11 Type of failure, that is, cohesive failure within the adhesive or adherend or adhesion to the adherend, or combination thereof, for each individual specimen.

### 10. Precision and Bias

10.1 A precision and bias statement does not exist for this test method because resources necessary for round-robin testing have not been forthcoming.

### 11. Keywords

11.1 adhesive bonding; flexible adherends; T-peel strength

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*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 100 Barr Harbor Drive, West Conshohocken, PA 19380.*